

## Flaws in Risk Assessment

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### Abstract

There is no extant doubt or ambiguity that there are extant flaws in risk assessment irrespective of the approach or methodology. However, speculations are rife as to the etiology of these untoward circumstances. In the face of stringent legislation and regulatory measures, it is evident that the proponents or harbingers of risk assessment regard compliance, trends and targets over health, safety and mitigating hazards when considering cost-benefit analysis in pecuniary terms. The lacunae in information and knowledge still persist in risk assessment, but the resolution of the conflict and speculations in etiologies and approaches are dependent upon the systematic and strategic analyses, nature and implications of stakeholders and uncertainties created. This paper discusses the flaws inherent in risk assessment which tend to obfuscate equity and natural justice for a sustainable society, with the need to re-orient the approach for present and future society.

**Key words:** agriculture, health, uncertainty, environment, anthropogenic activities, biosphere

### INTRODUCTION

Risk assessment connotes a regulatory and compliance process in health, safety and environmental management, whether by enterprise and/or governmental legislation, as perceived to cause harm and measures to prevent such adverse effects in a proactive manner [1, 2]. Risk is defined as  $R = P_f \times M_c$ , where  $R$  – risk,  $P_f$  is probability of failure, and  $M_c$  is the magnitude consequence at the occurrence of the failure mode, such that probability is relevant as consequence [3]. Flawed risk assessments may adversely plunge an organization into disrepute, restrict its freedom of action with resultant insolvency, especially where chemical toxicity in food and agriculture including flawed risk assessment with collusion between regulators and industries. It is vital to make provision for an extremely high quality scientific data and analysis for the production of a healthy food and agriculture system and a healthy global environment [4, 5]. On the availability of information, innovation, inventions, thematic approaches and ideas with analytical configurations, it is clear that risk assessment undergirded by expansive science and

technology will enact and shape the future of society [6]. It is undisputable that the ubiquitous technique for risk management and prioritization is flawed.

### ISSUES AND CONCEPTS IN FLAWED RISK ASSESSMENT

Assessment of the ubiquitous issues concerning personal and communal risks necessitates the employment of analytical instruments to evaluate environmental impacts and to model risks from engineered systems and putative anthropogenic activities. Also, it is pertinent to engage modalities to configure health impacts, such as dose-response associations at ambient or low exposure concentrations. Undergirding these dimensions are problems of risk perception, acceptability, communication and anthropogenic relatedness, cost-benefit analysis and risk-based methodology to analytical decision-making. The application of risk assessment methodology in management of risks has expansive effect on extant and future laws and regulations with constraints and challenges for the provision of pellucid and easily comprehensible risk evaluations

and monitoring as they encompass domains of specialties or interests as well as multidisciplinary characterization [7]. The most common problems encountered have been associated with inadequate data collection or collation, bias or predilection for common chemicals, arbitrary intake or uptake measurements and inappropriate risk characterization [8]. Thus, when experiments are conceived, there is the tendency to regulate the vital variables and to realize time-invariant reproducible outcomes [9].

These portend a peregrination of events for the provision and availability of safe, conducive, healthy and sustainable environment for everyone, particularly the occupational health and nomadic populations which are permeated with extant disparities in modalities and strategies to configure solutions or environmental best practices for the production of minimal adverse impacts. In the configuration of acceptable risk, one is minded to take moral perspective into consideration for natural justice for optimum maximization of life expectancy, human health and other functionality of the biosphere [10]. In targets and trends for precautionary measures to harness or curb environmental hazards or adverse impacts, it is pertinent to underscore measures regarding approaches which provide less benefit but more harm to the ecosystem which may border on the uncertainty principle. In the explication and elucidation of the means and deliberations on toxic/disease prevention and toxic/disease exposure respectively, in the domain of public health and targeted environmental thinking, it becomes pertinent to consider the inextricable linkage between disease and exposure. Exposure prevention is preferable to disease treatment, and may not necessitate disease association as the methodological linkage to a disease is unclear or absent. It is adduced that

quantitative risk assessment is (i) not amenable to unproven or unfounded hazards; (ii) ill-equipped to configure vulnerable or susceptible spans in human life cycle with the dose exposure of individual susceptibility involved in risk elicitation and the tendency to extrapolate the prediction of hazard effects; (iii) to deliberate obviate analytical consequences of cost-benefit analysis which would quantitatively configure and inculcate cultural values, aggregate personal costs and benefits, as well as discrete equitable distribution as embedded in natural justice, personal attributes and preferences while taking into cognizance the extant natural systems and salutary socioeconomic impacts; (iv) that uncertainties in quantitative risk assessments are not easily deciphered, thus culminating in complex or complicated unraveling of data on exposures, health impacts, regulatory modalities and efficiencies, pecuniary measures and ambiguous depictions; (v) to evaluate and set targets focusing on the political motivation to provide early warning signs and symptoms to the populace by shifting unfounded issues; (vi) anecdotal information and non-scientific data pervades quantitative risk assessment by spurious interpolation of events which elicit contradictions and conflicting evidence; (vii) compounded by expansive presentations of vulnerable populations to adverse pollution exposure [11]; and (viii) that the flaws in the procedure of risk assessment ostensibly culminates in a desired outcome for political reasons, objectives [12] trends and targets. Invariably, risk assessment has presented fallacious comparisons, inappropriate best estimates, arrogant and superfluous deliberations and pronouncements which engender suspicion, fear, superstition and phobia which may indict the modalities employed in a given situation.

## **COST-BENEFIT ANALYSIS AND UNCERTAINTIES**

Environmental management concerns cost-benefit analysis of stochastic processes. Decisions regarding perceived outcome and resultant impacts of these processes are dependent on an expansive range of uncertainties. A vast majority of these concepts are not taken into cognizance or are deliberately ignored in extant modalities and paradigm-shift to quantitatively and/or quantitatively address risk assessments [13]. The extent via which uncertainties may be ameliorated by taking into considerations selected types of uncertainty is suggestive of optional strategies to risk assessment which are fundamental latitude for polemics which are unambiguous, non-spurious, relatively transparent, internally congruous and consistent with expansive convergence in rigorous scientific discourse and achievement. A pragmatic risk evaluation confronting an entire entity provides adequate identification of impending hazards or threats. This sort of process that envisages risk assessment as a proactive and preempted facultative strategy assists in the valued dynamic enactment of an expansive and robust risk abatement modality with enabling and effective framework as well as efficient risk-adjusted mitigation approach that establishes a comparative advantage with resultant optimum returns. Contrariwise, a risk assessment process that is influenced by inappropriate principles presents an industry or enterprise in a vulnerable situation culminating in distressed outcomes. In order to determine direct pecuniary dissipation as the sole and direct resultant impact of a salient and perspicuous adverse occurrence emanating from risk assessment failure is otiose, as it depicts merely the proximate pecuniary dissipation as the sole hazard beneficiary in a lacuna of a more expansive approach o the aspect of the affected entity. It

indicates that the enterprise neglected to employ a strategy that realistically represents opportunities. A diligent risk assessment process must represent provisions devoid of unprofitable risks, inhibition of a potential problem at the inception of discovery or detection, and utilization of risk incidents to appropriate long-run advantages via newfangled ideas or innovations leading to potential growth. Whereas numerous organizations are eclectic in the utilization of a robust risk assessment modality as an essential commodity for the assurance of sustainable performance for the future, certain organizations lackadaisically restrict risk assessment efficacy and concerns to selective choice or exclusion of expected desired outcomes. The constraints and challenges common in risk assessments are also associated with (i) the perception of risk assessment as an impediment to routine activities designed for pecuniary gains rather than intermittent appreciation of risk assessment. This flawed presentation emanates from the incapacitation of the enterprise to enact a fundamental rationale for risk evaluation in equity and natural justice regarding the biosphere and presenting anthropogenic activities. Organizations become entangled in the actual process to the detriment of the available inextricable linkage of concepts and principles of fruitful adherence, compilation and completion of the risk assessment rather than due to obligatory requirements and compliance. There are also extant difficulties of post-assessment interpretation of collated data to foresee risks at an unprecedented pace, as they do not perspicuously explicate risks; and these leave the non-prioritization aspect for the implementation of the results configured. Ineffectual risk assessment culminating in otiose and spurious management strategy has resulted in adverse effects on health, environmental perturbations

with crass comparative advantage to other business enterprises [14].

#### ASPECTS AND STUDIES ON RISK ASSESSMENT

However, a reasonable scientific exploration of risk assessment has been conducted in the Ribeira Valley region in Sao Paulo State, Brazil where the largest Brazilian Atlantic forest reserve is located [15]. It constitutes a significant highly mineralized agricultural area. In the 1960s, inordinate amounts of Pb and other heavy metals were mined. In this derelict mining precinct, residues resulting from the erstwhile mining activities are disseminated in the environment. This characterization depicts a complex and inextricably linked natural and anthropogenic intrusions which impact on human health and wellbeing as well as other organisms. The application of digital data integration techniques for environmental risk assessment was conducted in the region via the utilization of environmental geochemistry. Geochemical digital elevation and remote sensing data (Landsat Thematic Mapper) were combined and analyzed by the application of geographical information system, GIS [16] that was modeled to appreciate environmental mobilization via erosion and anomalous As-Pb precincts. Data analysis comprised Boolean and fuzzy logic techniques in which the latter was more potent as it provided not merely the detection but the discrete variables between moderate and high environmental risk precincts [15]. The prioritization of the risk assessment and management activity must be geared towards transactional risk which a mining group is exposed to in the normal course of its enterprise as executive management functionality. At the foreclosure of mining activities, a continuous review process comprising identification of the principal risks confronting the enterprise is ranked based on

their inherent risks. Mitigation trajectories are detected and identified to ensure that residual risk remains at an acceptable and tolerable level accompanied by enumeration of applicable legislation and the magnitude of compliance [17].

It is clear that food legislation comprises both hazard- and risk-based strategies for adherence to safety. In hazard-based approaches, the incursion of a potentially harmful substance at a detectable concentration in food is employed as grounds for legislation and/or risk management action. Risk-based approaches provide the latitude that takes into cognizance exposure to assess the unacceptability of risks to health and safety of food, chemicals, ingredients allergens and microorganisms. These two types of approaches are liable to elicit problems when disparate agencies in regulation and compliance in food and agriculture. The resultant impact would be hazard-based restrictions on marketing and usage. However, risk-based assessments due to exposure demonstrate reasonable certainty that there will be no adverse effect which may tend to conflicting or contradictory, confusing and ultimately inappropriate and unnecessary actions. Hazard-based approaches with respect to food show that comparisons with benefits for food security and nutrition are not tenable. This may culminate in bias in the findings of regulators and risk managers who may have been deprived of the benefits and comparative advantage of specific foods. Expansive cognizance is given to the value of risk-based approaches [18].

Recent decades have exhibited scientific and technological developments in the food and agricultural sectors with resultant augmentation of production and certain public health concerns. Consumption of

contaminated commodities via naturally occurring mycotoxins and agrochemicals as well as the utilization of antibiotics in aquaculture and veterinary practices has culminated in human disease outbreaks. The use of diverse integrated food management systems, such as Hazard Analysis and critical control system approach for the prevention, control and monitoring of food hazard risks have been globalized to mitigate adverse exposure to human health from inimical agricultural practices [19].

Risk assessment should essentially prioritize expansive societal benefits, especially in aspects of sustainable agriculture. The main objectives would be the sustenance and augmentation of the quality and productivity of the soil and soil biota/microorganisms; conservation of energy, soil, natural resources, water, aquatic and terrestrial habitat; sustenance and the augmentation of ground and surface water quality, protection of health and safety of operators in the food and agriculture domain; provision of conducive ambient for fauna and flora; and enhanced employment opportunities in food and agriculture, especially in the rural areas [20]. In furtherance of these laudable goals are the necessity to abate the application of chemicals, pesticides, heavy metals, fertilizers and toxic natural substances in food and agricultural production; and improvement of low-input food and agricultural enterprise to augment food and agricultural safety, productivity, profitability, competitiveness and equitable distribution of resources, particularly in highly mineralized areas [5, 20-22].

#### DISCUSSION AND CONCLUSION

On the whole, it is pertinent to manage, track and report all dimensions of collated environmental information for regulatory obligations and compliance to maintain

sustainability profiles for the environment, and provide informed decisions for health data and risk analysis, particularly in highly mineralized agricultural areas [20]. Within an accelerated pace of changing and evolving global perspective, there are extant activities and outcomes which are inextricably linked with each other and the environment for health and food safety available to Man and animals. It becomes critical for the assessment of the resultant impact of both natural and anthropogenic activities in the biosphere to harness or curb the introduction of heavy metal-laden fertilizers as inputs in agricultural areas which are purposely located in rural areas. Through the modeling and interpretation of the uncertainties involving potentially adverse situations, these will provide the latitude to mitigate obnoxious substances and impacts as well as the aberration associated with these occurrences. It is plausible that quantitative risk assessment provides for a probabilistic strategy for the evaluation of perturbations in decision-making processes for health and food safety concerns [21]. Qualitative risk assessment is broadly employed to undergird organizational decision-making, and it is the basis of numerous enterprise risk management systems for health and safety. Although, qualitative risk assessment is assumed as a proven approach, an objective appraisal denotes the method as flawed and inchoate. It is involved with figures and calculations associated with enormous levels of ambiguity leading to tendency not to be able to distinguish between disparate risks, and prioritization of smaller risks in preference to higher risks. An additional fundamental issue is that qualitative risk assessment relies on the philosophy of “risk = probability x impact”, and the assumption that the essential features of a risk are restricted to its average value with optimum utilization of variability regarding range of



outcomes instead of merely the average [22]. Irrespective of the process involved, whether qualitative or quantitative risk assessment, conventional wisdom dictates that it is pertinent to solve specific constraints and challenges associated with the need for implementation of systems for risk management assessment. There are several optional methods [23] for the assessment and prioritization of risk, as well as opportunities and uncertainties which do not encounter these failures. Thus, applicable and requisite applications need to be employed to configure processes to obviate inimical intrusions into society for the present and the future [5, 22-25].

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